

**CLAIMS**

1. A method for mounting a flexible substrate during the fabrication of a liquid crystal display (LCD), the method comprising:

5                   forming a first rigid support substrate with trenches;  
                    forming a first flexible substrate overlying the first support substrate;

                    injecting adhesive into the first rigid support substrate trenches; and

10                   curing the adhesive to attach the first flexible substrate to the first support substrate.

2. The method of claim 1 further comprising:

                    subsequent to additional LCD fabrication processes,

15                   detaching the first support substrate and adhesive from the first flexible substrate.

3. The method of claim 1 further comprising:

                    depositing a plurality of patterned integrated circuit films

20                   overlying the first flexible substrate, forming thin film transistors (TFTs);

                    forming a liquid crystal (LC) layer overlying the TFTs;

and,

                    forming a color filter layer over the LC layer.

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4. The method of claim 3 further comprising:

forming a second flexible substrate overlying the color filter;

forming a second rigid support substrate with trenches overlying the second flexible substrate;

5                   injecting adhesive into the second rigid support substrate trenches; and

                  curing the adhesive to attach the second flexible substrate to the second support substrate.

10                   5.     The method of claim 1 wherein injecting adhesive into the first rigid support substrate trenches includes injecting the adhesive in a vacuum environment.

15                   6.     The method of claim 5 wherein forming a first rigid support substrate with trenches includes forming trenches with at least one trench mouth;

                  wherein injecting adhesive into the first support substrate trenches includes:

20                   creating a vacuum environment in the first rigid support substrate trenches;

                  supplying adhesive to the at least one mouth of the first rigid support substrate trenches;

25                   in response to returning the first rigid support substrate to ambient pressure, pulling the adhesive into the first rigid support substrate trenches vacuum environment through the at least one mouth.

7. The method of claim 6 wherein returning the first rigid support substrate to ambient pressure includes supplying an N<sub>2</sub> atmosphere at ambient pressure.

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8. The method of claim 1 wherein forming the first rigid support substrate with trenches includes forming a rigid support substrate from a material selected from the group including glass and plastic.

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9. The method of claim 1 wherein forming the first flexible substrate overlying the first rigid support substrate includes forming a flexible substrate from a material selected from the group including plastic and metal films.

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10. The method of claim 1 wherein forming the first rigid support substrate with trenches includes:

forming a rigid support substrate with a top surface;

forming a photoresist pattern with openings exposing the

20 underlying support substrate top surface;

etching the exposed support substrate top surface to form the trenches in the support substrate; and

removing the photoresist.

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11. A method for mounting a flexible substrate in the fabrication of a liquid crystal display (LCD), the method comprising:

forming a first rigid support substrate;  
distributing a first pattern of spacers, with spacer  
channels between the spacers, overlying the first support substrate;  
forming a first flexible substrate overlying the first pattern  
5 of spacers;  
injecting adhesive into the spacer channels; and  
curing the adhesive to attach the first flexible substrate to  
the first support substrate.

10 12. The method of claim 11 further comprising:  
subsequent to additional LCD fabrication processes,  
detaching the first support substrate, spacers, and adhesive from the  
first flexible substrate.

15 13. The method of claim 11 further comprising:  
depositing a plurality of patterned integrated circuit films  
overlying the first flexible substrate, forming thin film transistors  
(TFTs);  
forming a liquid crystal (LC) layer overlying the TFTs;  
20 and,  
forming a color filter layer over the LC layer.

14. The method of claim 13 further comprising:  
forming a second flexible substrate overlying the color  
25 filter;

distributing a second pattern of spacers, with spacer channels between the spacers, overlying the second flexible substrate; forming a second rigid support substrate overlying the second pattern of spacers;

5           injecting adhesive into the spacer channels; and

          curing the adhesive to attach the second flexible substrate to the second support substrate.

15           15.    The method of claim 11 wherein injecting adhesive into the spacer channels includes injecting the adhesive in a vacuum environment.

15           16.    The method of claim 15 wherein distributing a pattern of spacers, with spacer channels between the spacers includes forming spacer channels with at least one mouth; and

          wherein injecting adhesive into spacer channels includes: creating a vacuum environment in the spacer channels; supplying adhesive to the at least one spacer channel mouth;

20           returning the first rigid support substrate to ambient pressure; and

          in response to returning the first rigid support substrate to ambient pressure, pulling the adhesive into the spacer channels vacuum environment through the at least one mouth.

17. The method of claim 16 wherein returning the first rigid support substrate to ambient pressure includes supplying an N<sub>2</sub> atmosphere at ambient pressure.

5 18. The method of claim 11 wherein forming the first rigid support substrate trenches includes forming a rigid support substrate from a material selected from the group including glass and plastic.

10 19. The method of claim 11 wherein forming the first flexible substrate overlying the pattern of spacers includes forming the first flexible substrate from a material selected from the group including plastic and metal films.

15 20. A structure to support a flexible substrate liquid crystal display (LCD) during fabrication, the structure comprising:  
a first rigid temporary support substrate with trenches;  
a first flexible substrate overlying the temporary support substrate; and  
20 vacuum injected adhesive in the trenches to attach the first temporary rigid support substrate to the first flexible support substrate.

25 21. The structure of claim 20 further comprising:  
integrated circuit (IC) films, formed into thin film transistors (TFTs), overlying the first flexible substrate.

22. The structure of claim 21 further comprising:  
a liquid crystal (LC) layer overlying the TFTs;  
a color filter overlying the LC layer.

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23. The structure of claim 22 further comprising:  
a second flexible substrate overlying the color filter;  
a second rigid temporary support substrate with trenches  
overlying the second flexible substrate; and,

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vacuum injected adhesive in the second temporary  
support substrate trenches to attach the second temporary rigid  
support structure to the second flexible support structure.

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24. The structure of claim 20 wherein the first  
temporary support substrate is made from a material selected from  
the group including glass and plastic.

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25. The structure of claim 20 wherein the first flexible  
substrate is made from a material selected from the group including  
plastic and metal films.

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26. A structure to support a flexible substrate liquid  
crystal display (LCD) during fabrication, the structure comprising:  
a first rigid temporary support substrate;  
a first temporary pattern of spacers, with spacer channels  
between the spacers, overlying the first temporary support substrate;

a first flexible substrate overlying the first temporary pattern of spacers; and

vacuum injected adhesive in the spacer channels to attach the first temporary support substrate to the first flexible  
5 substrate.

27. The structure of claim 26 further comprising:  
integrated circuit (IC) films, formed into thin film transistors (TFTs), overlying the first flexible substrate.

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28. The structure of claim 27 further comprising:  
a liquid crystal (LC) layer overlying the TFTs; and,  
a color filter overlying the LC layer.

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29. The method of claim 28 further comprising:  
a second flexible substrate overlying the color filter;  
a second temporary pattern of spacers, with spacer channels between the spacers, overlying the second flexible substrate;  
a second rigid temporary support substrate overlying the  
20 second temporary pattern of spacers; and,

vacuum injected adhesive in the spacer channels to attach the second temporary support substrate to the second flexible substrate.

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31. The structure of claim 26 wherein the first flexible substrate is made from a material selected from the group including plastic and metal films.